Developing intermediate knowledge to support designers in designing for social interaction and physical play

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Introduction

This position paper describes how we develop intermediate design knowledge through design research. The aim of our design research is to provide designers with knowledge that inspires the creation of novel design solutions for play, and to show design relevance of theory, illustrated by diverse prototypes.

The purpose of the paper is to contribute to the discussion on how to conduct concept-driven design research and how to construct and assess intermediate-level knowledge for interaction design. With concept-driven design research, we mean design research informed by *theoretical concepts (Stolterman and Wiberg, 2010)*.

Creating intermediate design knowledge for designers: combining effect driven design and concept driven research

To create intermediate design knowledge for designers we develop designs for real world contexts and then examine what theoretical knowledge helped make good design decisions. We integrate these two processes in our design research: we use an effect-driven approach to create designs that result in social interaction (bottom cycle of Figure 1) and a concept-driven approach to develop design tools for designers (top cycle of Figure 1).
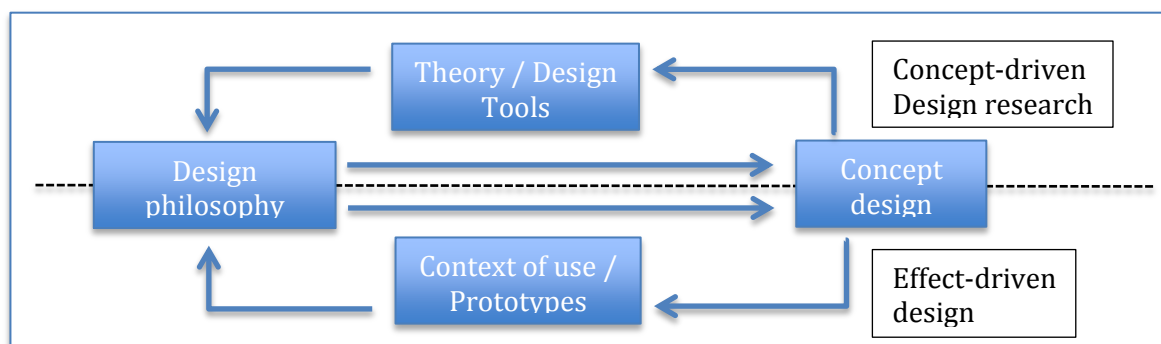

Figure 1: Design Research process, guided by design philosophy (left), with a Theory angle (top) and Context of use (bottom) angle, resulting in prototypes, and design tools (inspired by figure in Stolterman and Wiberg, 2010)

In turn, the design tools (incorporating **core concepts**) can be used in subsequent effect-driven design projects. The core concepts are developed iteratively from a theoretical and design practice, thus being closest to the idea of bridging concepts as presented by Dalsgaard and Dindler (2014).

Based on a **post-hoc analysis** of our own design research approach we have uncovered three main phases in the development of our vision on designing intelligent play environments for children and related core concepts: exploration, definition of core concepts, combination of core concepts (see Figure 2). In this position paper we focus on the first two phases. The post hoc analysis consisted of examining the design cases (our own and with students of our department) we conducted over a period of eight years (2006 – 2014), and the papers we have written during this time.

Summary of phase A: We found a number of interesting design parameters (mentioned in Sturm et al, 2008), of which designing for **open-endedness** was the most interesting one. So, what are properties of a good '**core concept**'? That it has a relationship with the intended user behaviour, and that it allows enough design freedom to lead to diverse solutions. The concept of 'open-endedness' was sufficiently open to allow influence on diverse design parameters, e.g. on input and output opportunities.
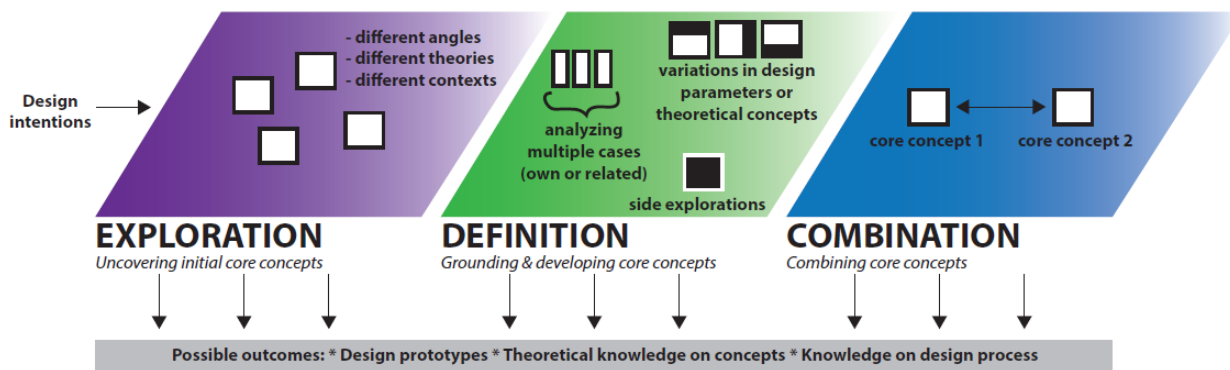
Figure 2: Overview of design research activities in the three phases of the design research approach.

It incorporates some aspects related to the design itself, and related to the users' behaviour. Others concepts mentioned in the early analysis of multiple design cases, such as '*social interaction*' is related only to the users, and '*feedback*' is possibly too narrow a topic already. Open-endedness leaves more room for exploring design properties.

In phase B the core concept of open-endedness was developed further through various design research activities, including conducting design cases that examined different design parameters, and in different contexts. In contrast with phase A, the concept of open-endedness is embedded in the design briefs explicitly from the start. Furthermore, the core concept is defined better in relation to other theoretical concepts (see Valk et al. , 2013)

Summary of phase B: Reflecting on similarities over diverse application domains (e.g. as described in Bekker et al, 2010) the similarity in the approach lies in creating opportunities for social interaction, for exploring a space, for physical and social interaction, by balancing between providing some structure and guidance, and some sense of self-control.

Variations in design explorations grounded in different theoretical concepts are most promising in developing intermediate level knowledge further. Ideas for directions of different theoretical concepts can come from exploring variations in context of use, and variations / nuances in *intended user behaviours*.

Conclusion

The need for understanding how knowledge (in the form of core concepts) may be applied in design is supported by examining how different designers (in our case mostly design students) find value in descriptions of the core concept.

Core concepts are developed iteratively by examining what are good properties to reach design intentions (effect-driven design). They may be inspired by theoretical concepts, but can only be framed and developed further through design explorations in diverse design contexts, and being applied by different designers and, or design students. We are now examining different formats for presenting the core concepts, e.g. in a card design tool.

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